

Plus-X 300

Installation and Operation Manual



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Introduction

The Plus-X 300 works in conjunction with the Burk Technology ARC Plus transmitter remote control to provide eight inputs and eight outputs for remote monitoring and control. Metering and status inputs are sent from the Plus-X 300 to the ARC Plus via Ethernet. The ARC Plus then reports these values as independent metering and status channels. The relay outputs on the Plus-X 300 are controlled by the ARC Plus via commands and macros.

The Plus-X 300 has eight (8) inputs, each configurable as metering or status. Eight (8) output relays allow control of site equipment. Relays may be activated independently or operated in pairs for mutually-exclusive output.

Compatibility

Before installing the Plus-X 300, please verify that the ARC Plus firmware, AutoPilot software and AutoLoad Plus software versions are current. Updates are available at www.burk.com/downloads.

The following are minimum software and firmware requirements:

<i>Software</i>	<i>Version</i>
ARC Plus firmware	2.0 or higher
AutoLoad Plus software	2.0 or higher
AutoPilot® software	2.6 or higher

Installation

The Plus-X 300 ships with the following parts, which are required for installation:

- (1) Ethernet cable
- (1) 15V wall adapter
- (1) 2-pin Phoenix-type connector (for power connection)
- (1) 9-pin Phoenix-type connector (for input channels)
- (2) 12-pin Phoenix-type connectors (for relay outputs)
- (4) Rubber feet (for optional horizontal mounting)

Before you start, you will need to use a standard Cat5 cable (included) to connect the Plus-X 300 to your network. It is recommended that you only set up one Plus-X 300 device at a time on the network so a unique NETBIOS hostname can be assigned to each unit.

For wall mounting, secure the Plus-X 300 using #8 hardware (not included) and chassis cutouts. Alternatively, the Plus-X 300 may be mounted flat on top of an equipment rack, shelf or another suitable location.

Power & Ethernet Connections

Apply power to the Plus-X 300 by connecting the 2-pin power connector to the rear-panel input marked POWER. The power connector is pre-wired to the 15V wall adapter. Plug the power adapter into a standard 120V outlet. The POWER LED will illuminate.

Finally, connect the included Ethernet cable to your network switch.

Important!

The Plus-X 300 must be addressable by the ARC Plus to which it will communicate. Consult your IT department prior to configuration to resolve any IP address or firewall conflicts.

Configuration

Configuring the Plus-X 300 involves establishing the network settings, setting up channel parameters, setting the password, and then adding the newly configured Plus-X channels to the ARC Plus system. The username is **admin** and the default password is **password**.

Initial Connection Using DHCP

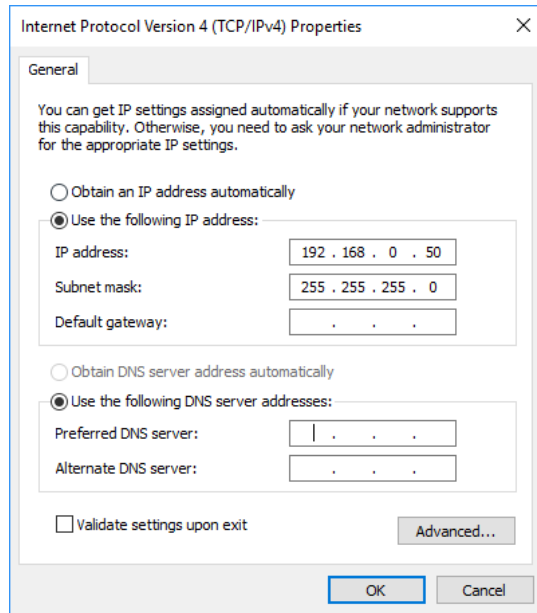
Plus-X 300 units running firmware 1.0.15 or higher support Dynamic Host Configuration Protocol (DHCP) as an easy way to do initial setup. Connect the Plus-X 300 to your LAN and apply power. If this is the first power-up for a new unit or the first network connection after execution of a master-initialization, the Plus-X 300 will issue a DHCP request for an IP address. If the network supports DHCP functionality, a dynamic IP address will be assigned to the unit. To access the Plus-X 300, launch a web browser and enter the hostname "PLUSX300/" in the browser's address field. (Be sure to include the forward-slash symbol at the end of the hostname.) The login screen for the unit will be displayed. Go to [Log In to the Plus-X 300](#), below

Note: If the login page is not displayed or the browser indicates that the page cannot be found, it is possible the connected network does not support DHCP. In this case follow the steps outlined below for "Initial Connection Without DHCP". Otherwise, continue to [Log In to the Plus-X 300](#).

Initial Connection Without DHCP

If your network does not support the DHCP protocol, the Plus-X 300's request for a dynamic IP address will fail. If this happens, the Plus-X 300 will assign itself the default static IP address 192.168.0.100. To access the unit, it will be necessary to connect your PC directly to the Plus-X 300 using a crossover LAN cable or using a simple Ethernet switch.

In addition, your PC's internal network interface must be set to a static IP address of the form 192.168.0.x. In the Windows Control Panel, search for *Network Connections*, then select *View network connections* then *Local Area Connection*. Navigate to the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box as displayed below.



Select “Use the following IP address:” and enter an address of the form 192.168.0.x, where x is any value between 1 and 255 except 100 which is the Plus-X 300 default IP address. Also set the subnet mask to 255.255.255.0 as shown above and click *OK*.

Next launch a browser and enter 192.168.0.100 in the address field. The login screen for the Plus-X 300 will be displayed.

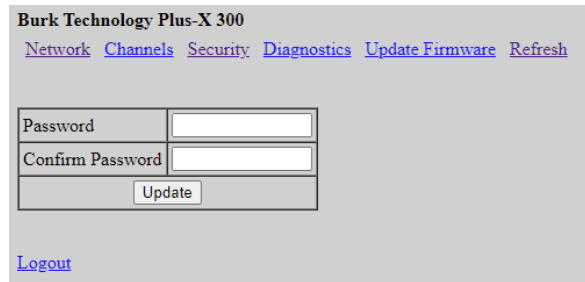
Log In to the Plus-X 300

The login screen for the Plus-X 300 is shown below.



Enter the default Username ***admin***, and the default Password ***password***.

You will be prompted that the password is weak and will be recommended to change it. You can also change the password at any time from the Security link on the Plus-X 300 web page.

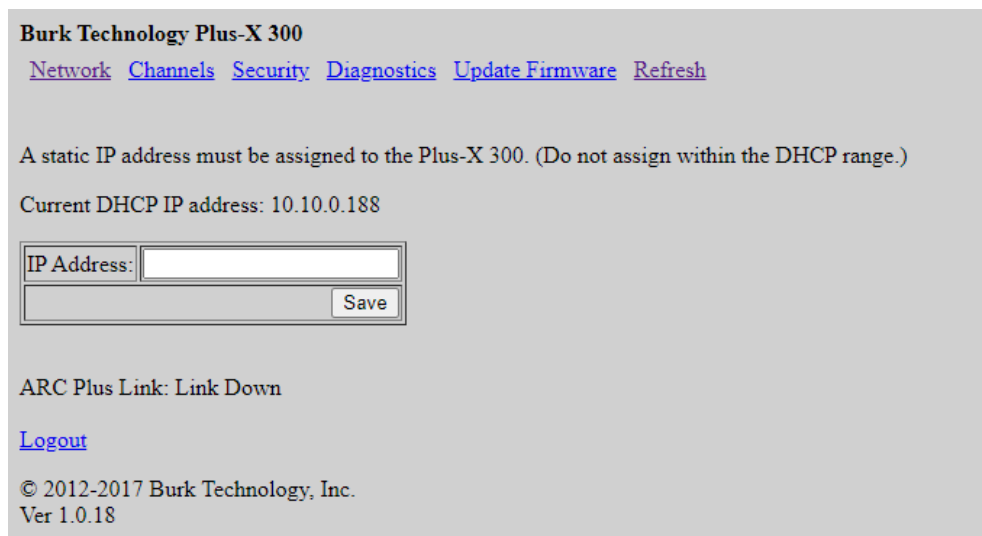


The screenshot shows the Burk Technology Plus-X 300 web interface. At the top, there are navigation links: [Network](#), [Channels](#), [Security](#), [Diagnostics](#), [Update Firmware](#), and [Refresh](#). Below these links is a form with two input fields: "Password" and "Confirm Password". Below the input fields is an "Update" button. At the bottom left of the form area, there is a [Logout](#) link.

Once the password has been set and confirmed, click update.

Set a Static IP Address

Next, select the *Network* menu option. The page shown below will be displayed, showing the current IP address.



The screenshot shows the Burk Technology Plus-X 300 web interface for setting a static IP address. At the top, there are navigation links: [Network](#), [Channels](#), [Security](#), [Diagnostics](#), [Update Firmware](#), and [Refresh](#). Below these links, a message states: "A static IP address must be assigned to the Plus-X 300. (Do not assign within the DHCP range.)". Below this message, it says "Current DHCP IP address: 10.10.0.188". There is an input field labeled "IP Address:" and a "Save" button below it. At the bottom left, there is a link for "ARC Plus Link: Link Down" and a [Logout](#) link. At the bottom, the copyright information is displayed: "© 2012-2017 Burk Technology, Inc. Ver 1.0.18".

Enter a static IP address for this unit as assigned by your network administrator in the *IP Address* box and click *Save*.

Note: It is important that the assigned static IP address be outside the DHCP address range used by the router to avoid potential conflicts with other DHCP devices.

Configure Network Settings

Select the *Network* menu option again. A more extensive selection of network settings will now be displayed as shown below. Explanations for each item are shown at the right of the screen.

Burk Technology Plus-X 300
[Network](#) [Channels](#) [Security](#) [Diagnostics](#) [Update Firmware](#) [Refresh](#)

Name:	<input type="text"/>	An optional name that is displayed on the log in page and the header.
Hostname:	PLUSX300	An optional hostname for use on a local network.
IP Address: *	192.168.0.55	The static IP address for this unit. (Do not assign within the DHCP range.)
Subnet Mask: *	255.255.255.0	The subnet mask associated with the IP address above.
Gateway: *	192.168.0.1	The IP address of the router used for connections outside the local network.
ARC Plus IP Address: *	0.0.0.0	The IP address of the ARC Plus that communicates with this device.
	Link Down	
HTTP Port: *	80	The port number to use for the web page. By default this is port 80.
Plus-X Port: *	45000	The port number to use for communication with the ARC Plus. By default this is port 45000.
	<input type="button" value="Save"/>	

* Indicates required field

ARC Plus Link: Link Down

[Logout](#)

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Ver 1.0.17

It is recommended that you enter a recognizable name for the unit in the *Name* field. This name will be displayed on the web page making it easy to confirm which unit you are connected to.

The NETBIOS *Hostname* can be used to access the Plus-X 300 on the network if the IP address is not known. It is highly recommended that you assign a unique hostname to each Plus-X 300 on your network. By default the *Hostname* is set to PLUSX300.

Enter the IP address of the ARC Plus that will host the metering, status and command channels of the Plus-X 300 in the *ARC Plus IP Address* field.

The default *Plus-X Port* setting of 45000 will work in most installations. However, if you have changed the Plus-X port during ARC Plus configuration, the Plus-X port you enter here should match that setting.

Press the **Save** button when you are finished.

If your initial connection was made without DHCP, your PC should now be restored to its prior network settings, and both the PC and the Plus-X 300 should be connected to the normal LAN.

Configure Channel Settings

The Channels page is where you configure high and low status thresholds for up to eight status channels, as well as relay behavior for each of eight relay outputs.

Input Configuration and Wiring

In the Status Thresholds table, enter the input values that will trigger status changes from low to high and vice versa. The **Lower** threshold is the value below which a voltage sample must decrease in order to change the status from high to low. The **Upper** threshold is the value above which a voltage sample must increase in order to change the status from low to high.

Voltages between the lower and upper thresholds do not cause a status change on the ARC Plus. For example, if a voltage sample increases beyond the Lower threshold, but does not reach the Upper threshold, the status indicated on the ARC Plus does not change.

Note that each input may be used as a metering channel, status channel or both. In other words, an analog temperature reading may also drive “high temp” and “low temp” status alarms.

Status Thresholds			
Input	Lower (mV)	Upper (mV)	Update
1	<input type="text" value="1000"/>	<input type="text" value="1000"/>	<input type="button" value="Update"/>
2	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
3	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
4	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
5	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
6	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
7	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>
8	<input type="text" value="1000"/>	<input type="text" value="2500"/>	<input type="button" value="Update"/>

Metering and status channels are wired to the Plus-X 300 using the included 9-pin connector block. To connect metering and status inputs, loosen the screws on the connector block and connect voltage wiring from the site equipment to the Phoenix connector inputs to align with the 1-8 numbering on the chassis. Insert a common ground reference to the Phoenix connector to align with the ground symbol on the chassis. Tighten the set screws.

Relay Output Configuration & Wiring

Next, define the behavior for each of eight relay outputs. Each relay may be set for momentary or latching output. Check the **Pair Relay Channels** box in order for the relays to act as mutually exclusive pairs. When this box is checked, a command to one relay will cause the second relay to de-energize.

	Relay 1	Relay 2
Type	<input checked="" type="radio"/> Latching <input type="radio"/> Momentary	<input checked="" type="radio"/> Latching <input type="radio"/> Momentary
<input type="checkbox"/> Pair Relay Channels		
<input type="button" value="Update Relay 1 & 2"/>		

*Note: When the **Pair Relay Channels** box is checked, it is recommended to configure the two paired relays with the same behavior (Latching / Latching or Momentary / Momentary). If one relay is configured as Latching and the other as Momentary, a command to the momentary relay will de-energize the latching relay. After the momentary command is finished, both relays will remain de-energized until a new command is issued to one of the relays.*

Command output wiring is facilitated by the two 12-pin connector blocks. Each relay 1-8 has Common (C), Normally Open (NO) and Normally Closed (NC) connections labeled on the rear panel. Loosen the set screws on the Phoenix connectors and make wiring connections according to the requirements of the site equipment under control. Tighten the set screws.

Latching Relay State During Plus-X 300 Reboot

The Plus-X 300 reboots as part of the firmware upload process. The unit will also reboot to re-establish communications if the network link between the Plus-X 300 and the ARC Plus unit is interrupted for greater than three minutes. Plus-X 300 relays configured as Latching will briefly de-energize during reboot, returning to their preset value when the reboot completes. An external mechanically latching relay should be used for critical functions to hold the preset value while the Plus-X 300 is rebooting.

When finished making equipment connections, disconnect the Phoenix connectors from the Plus-X 300 until configuration is complete.

Security

Navigate to the Security page to set the password for the Plus-X 300. This password is used only to access the Plus-X configuration screens. ARC Plus usernames and passwords are set up using AutoLoad Plus software.

The Plus-X 300 username is always **admin**.

Adding Plus-X Channels to the ARC Plus

Now that you have configured the input and output channels on the Plus-X 300, these channels may be added to the ARC Plus site using AutoLoad Plus. To add Plus-X 300 channels to the ARC Plus:

1. Launch AutoLoad Plus and connect to the ARC Plus site to which the Plus-X 300 is linked.
2. From the **Edit** menu, select **Plus-X Devices...** and click **New**.
3. When the Plus-X Settings window appears, select Plus-X 300 from the device type drop-down. Enter a description of the Plus-X 300 for your own reference, followed by the IP address and Plus-X port, both of which are already configured on the Plus-X 300.
4. Check the box marked **Map Default Set of Channels** to add all eight inputs and eight relays to the ARC Plus. If you are not using all Plus-X 300 channels or if you do not wish for them to appear in sequential order, you will need to manually map these channels later. In this case, leave the **Map Default Set of Channels** box unchecked.
5. Press **OK** to close the Plus-X Settings window. Press **OK** to close the Plus-X Devices window.
6. To manually map Plus-X 300 channels to the ARC Plus, click the Metering, Status or Commands tabs, as appropriate. Locate an unused channel and click the [...] button in the Source column. This will bring up the Source dialog box. Click the **Plus-X** button and choose the Plus-X 300 channel you wish to use. At least one meter channel and one command channel on the Plus-X 300 must be configured within the ARC Plus for the Plus-X device to register as online in the ARC Plus system.
7. Configure labels, limits and alarms for the newly added Plus-X 300 channels in the same way as you would configure labels, limits and alarms for other ARC Plus channels.

8. Lastly, you will need to calibrate the Plus-X 300 channels. If you have not already connected the input connector blocks, do so now. Then click the **Calibration** icon in the AutoLoad Plus toolbar to complete the calibration process.

Restoring Factory Configuration

To reset the unit to its default configuration, press the front panel **Config** button three times. The Power LED will blink to confirm the configuration has been reset. Note that the restoring default configuration will reset the unit's password to **password** and revert the IP address to 192.168.0.100.

Uploading New Firmware

For instructions on updating the firmware on the Plus-X 600, visit www.burk.com/downloads, select the support page for the Plus-X 300 and download *Manual – Burk Firmware Loader*.

Operation

Taking Readings & Issuing Commands

Once you have added Plus-X 300 channels to the ARC Plus, they appear on the ARC Plus front panel, AutoPilot® software, Web Interface and RSI speech interface just as any other ARC Plus channel. They can be used in macros and custom views. The Plus-X 300 is responsible for reporting the raw sample values to the ARC Plus, while the ARC Plus applies the calibration constant, limits and alarm settings.

Maintenance Mode

Maintenance Mode is a safety feature that prevents command execution while personnel are performing work at the remote site. Maintenance Mode on the Plus-X 300 can be activated by two means: 1) placing the ARC Plus in maintenance mode using the ARC Plus front panel menus; and 2) placing the Plus-X 300 in maintenance mode using the Plus-X front panel MAINT button.

When the ARC Plus is in maintenance mode, it will not issue commands or macros to any ARC Plus channels, including Plus-X 300 channels. It is still possible to issue test commands via the Plus-X 300 diagnostics page (see *Diagnostics*).

When the Plus-X 300 is in maintenance mode, the ARC Plus can issue commands and macros to other channels, but Plus-X 300 commands are disabled.

Maintenance mode must be toggled from the respective front panels. For safety reasons, maintenance mode cannot be enabled or disabled by any remote means. The front LED will illuminate red to indicate that maintenance mode is enabled.

Diagnostics

The Plus-X 300 has a diagnostics page built into the configuration web pages. This allows administrators to verify raw input voltage readings against real-world measurements and to test relay behavior; it is not intended for routine monitoring and control of equipment.

To access the diagnostics page, open a web browser and enter the IP address of the Plus-X 300. After logging in, use the links at the top of the screen to navigate to the Diagnostics page.

Getting Help

For technical support, please email support@burk.com or call our direct technical support line at 978-486-3711. We will be glad to assist you. The technical support office is open Monday – Friday, 9AM to 5PM Eastern time.

Warranty

Burk Technology, Inc. warrants the Plus-X 300 to be free of defects in materials and workmanship for a period of 24 months from the date of purchase. Equipment will be repaired or replaced at the option of Burk Technology and returned freight prepaid to the customer. Damage due to abuse or improper operation or installation of the equipment or caused by fire or flood or harsh environment is not to be covered by this warranty. Damage in shipping is not the responsibility of Burk Technology. A return authorization must be obtained before returning any equipment. Materials returned under this warranty must be shipped freight prepaid and insured in the original shipping carton or suitable substitute to Burk Technology, Inc., 7 Beaver Brook Road, Littleton, MA 01460. Repairs not covered under this warranty will be made at prevailing shop rates established by Burk Technology.

THE WARRANTY SET FORTH ABOVE IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BURK TECHNOLOGY, INC. SHALL NOT BE LIABLE TO ANY PARTY FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF THIS EQUIPMENT.

Appendix A: Specifications

Dimensions:

1.35" (3.43cm) H

9.2" (23.4cm) W

3.85" (9.78cm) D

Operating Temperature:

0° to 50°C

0 to 95% RH, non-condensing

Power Requirements:

15VDC at 0.5A (power adapter included)

Metering Inputs:

>0 to 10VDC, 10mV resolution

Status Inputs:

>0 to 28VDC or switch closure

Relay Outputs:

5A, 240VAC, form C relay outputs, (C, NO, NC), each user-configurable for momentary or latching output

Hysteresis:

User-configurable set points per input channel

Mounting:

Keyhole slots for surface mounting; Available RMA300 rack mount adapter.